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**DATA AND DOCUMENTS MANAGEMENT AND
QUALITY ASSURANCE PLAN
FOR
PADUCAH ENVIRONMENTAL MANAGEMENT
AND ENRICHMENT FACILITIES**



Q-00001-0025

SEPTEMBER 1998

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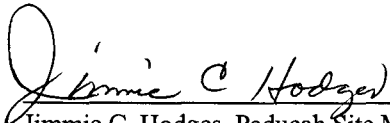
Document Identification: Paducah Gaseous Diffusion Plant

**Data and Documents Mangement and Quality Assurance Plan for Paducah
Envirionmental Mangement and Enrichment Facilities**

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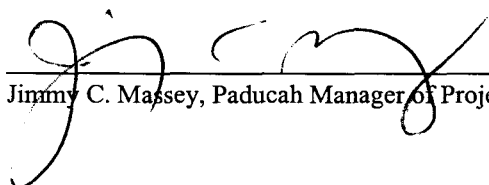
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Bechtel Jacobs Company LLC
Co-Operator



Jimmy C. Massey, Paducah Manager of Projects

10/5/98

Date Signed

Q-00001-0025



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**DATA AND DOCUMENTS MANAGEMENT AND
QUALITY ASSURANCE PLAN FOR
PADUCAH ENVIRONMENTAL MANAGEMENT
AND ENRICHMENT FACILITIES**

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U.S. DEPARTMENT OF ENERGY
Under Contract No. DE-AC05-98OR22700**

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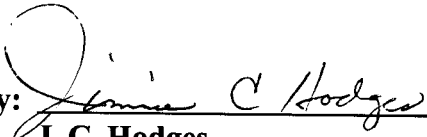
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PREFACE

This plan is generated to define the roles, responsibilities, and activities affecting data management, document management, and quality for data collection between the Department of Energy (DOE) and the regulatory agencies that govern the Paducah Gaseous Diffusion Plant (PGDP) Federal Facility Agreement (FFA). Pursuant to the FFA section titled "Quality Assurance/Sampling Availability/Data Management," all quality-assured data or summaries of all quality-assured data from all samples collected, analyzed, and reported shall be available no later than 30 days after the analyses have been received and validated. Further, DOE shall maintain one consolidated database for the Site which includes all data/studies generated pursuant to this agreement. To fulfill this requirement, Paducah DOE has an integrated "data system" made up of many databases managed by one organization. Electronic formats and/or hard copies of all data/studies and related documents are made available upon request.

In addition to the requirements in the Federal Facility Agreement (FFA), other agreements require a consolidated data management process:

- 1) Environmental Protection Agency (EPA) Hazardous and Solid Waste Amendment Permit states:

Condition I.D.9.d.—Monitoring and Records

"All environmental monitoring data collected pursuant to Part II of this Permit shall be submitted to the Regional Administrator in a consistent format, with consistent parameters and concentration units. This will facilitate collection and recording of such data in a computer data file. Within one (1) year from the effective date of the Permit, this monitoring data shall also be routinely submitted electronically and on computer disc..."

Condition II.E.3.b.—Interim Measures (IM) Reports

"...The IM Report shall contain the following information at a minimum, (e) copies of all relevant laboratory/monitoring data, etc., in accordance with Condition I.D.9."

- 2) Kentucky Division of Waste Management Hazardous and Solid Waste Permit states:

Condition III.E.9.a.—Monitoring and Records

"...All environmental and monitoring data collected pursuant to Part II.J and Part IV of the Permit shall be submitted to the Division, both in written and electronic format. Sampling data shall be submitted in accordance with the schedules described in this Permit."

- 3) Agreement in Principle states:

"...DOE will promptly furnish to Kentucky environmental monitoring data in electronic format, if available, or paper copies. DOE data reports will be released to Kentucky within 90 days after receipt from the laboratory and completion of the appropriate level of review and quality assurance/quality control (QA/QC) validation..."

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ACRONYMS

AIP	Agreement in Principle
AR	Administrative Record
ASER	Annual Site Environmental Report
ASTM	American Society for Testing and Materials
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chain-of-custody
DOE	Department of Energy
DMC	Document Management Center
DMP	Data Management Plan
DMS	Data Management System
DQO	Data Quality Objectives
EDD	Electronic Data Deliverable
EMEF	Environmental Management & Enrichment Facilities
EMP	Environmental Monitoring Program
EMP PEMS	Environmental Monitoring Program Project Environmental Measurements System
EMP RTL	Environmental Monitoring Program Ready-to-Load
EPA	Environmental Protection Agency
ER PEMS	Environmental Restoration Project Environmental Measurements System
ER RTL	Environmental Restoration Ready-to-Load
FFA	Federal Facility Agreement
GIS	Geographic Information System
GW PEMS	Groundwater Project Environmental Measurements System
GW RTL	Groundwater Ready-to-Load
IM	interim measures
NENW PEMS	North East/North West Project Environmental Measurements System
NENW RTL	North East/North West Ready-to-Load
OREIS	Oak Ridge Environmental Information System
PC	personal computer
PEMS	Project Environmental Measurements System
PGDP	Paducah Gaseous Diffusion Plant
QA	quality assurance
QAMS	Quality Assurance Management Staff
QC	quality control
RCRA	Resource, Conservation, and Recovery Act
SAP	Sampling and Analysis Plan
SMO	Sample Management Office
SOW	Statement of Work
SWMU	Solid Waste Management Unit
VOA	volatile organic analysis
VOC	volatile organic compound
WAG	Waste Area Grouping
WM PEMS	Waste Management Project Environmental Measurements System
WM RTL	Waste Management Ready-to-Load

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DEFINITIONS

Administrative Record (AR)—Official body of documents that forms the basis of the selection of a particular response action.

Chain-of-Custody (COC)—A process used to document the transfer of custody of samples from one individual to another from collection until final disposition. A sample is under custody if:

1. it is in the field personnel's possession;
2. it is in the field personnel's view after being in their physical possession;
3. it was in the field personnel's physical possession and then it was secured to prevent tampering; or
4. it is placed in a designated secure area.

Data Backup—The process by which computerized data is copied from one electronic medium to another to guard against the loss of data.

Data Entry—The manual keying of information using data entry screens for transfer into a database.

Data Qualifiers—A set of predefined alphabetic or numeric codes applied to analytical data to signify its usability. Qualifiers pertaining to data include laboratory qualifiers, verification qualifiers, validation qualifiers, and assessment qualifiers.

Data Quality Checks—A list of quality control (QC) elements associated with a data collection activity which are evaluated during data verification and/or data validation.

Data Quality Objectives (DQO)—A set of criteria established for the collection of data. The DQO process is based on the DQO process developed by the Environmental Protection Agency (EPA), Region IV and is a planning tool based on the scientific method that clearly identifies an environmental problem; the remedial decisions to be made to address the problem; and the type, quantity, and quality of data needed to support decision making. The DQO process may be applied in modified form to any data collection activity. The DQO process balances risks with cost, in selecting the most appropriate data collection plan.

Paducah Department of Energy (DOE) Program Integrated Data System—An integrated computer system for data storage and retrieval that organizes data into tables consisting of one or more rows of information, each containing the same set of data items. Data files are cross-referenced to one another to provide flexible access so that data collection is complete, consistent, sufficiently documented, and reusable to the maximum extent possible. The Paducah DOE Program Integrated Data System is compatible with the central Oak Ridge Environmental Information System (OREIS) to comply with the Oak Ridge Federal Facilities Agreement (FFA).

Data Transfer—The exchange of data from one electronic medium to another.

Document—Writings, drawings, graphs, charts, photographs, electronic tapes, diskettes, and data compilation from which information can be obtained.

DEFINITIONS (Continued)

Document Management Center (DMC)—A location established for a targeted audience where individual documents are tracked and maintained for audit purposes. It also may be a center where collection of controlled documents is maintained. Paducah's established location is the document center at 761 Veterans Avenue, Kevil, Kentucky.

Document Management System (DMS)—A computerized system used by the DOE Program at the Paducah Gaseous Diffusion Plant (PGDP) to facilitate the electronic handling of bibliographic, file classification, and index information.

Electronic Data Deliverable (EDD)—Data that is received in electronic format either through transfer on physical media or direct communication between computerized data management systems. EDD contents must meet defined completeness, consistency, and format requirements. These criteria are defined in the Statement of Work (SOW) for each program or project.

Electronic Media—Data storage device such as diskette, disk drive, tape, or optical disk.

Field Logbooks—The primary record for field activities. They should include a description of any modifications to the protocols outlined in the work plan, field sampling plan, or health and safety plan with justifications for such modifications. They are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred. All entries should be dated and signed by the data recorder and quality assured by another individual.

Historical Data—Data which was collected and managed prior to implementation of procedure PMSA-1001, "Quality Assured Data."

Metadata—Information about measurement data that helps to define data usability and associated context.

Quality Assurance (QA) and Data Management Plan (DMP)—A document written for each task that presents in specific terms the policies, organization, objectives, functional responsibilities, and specific QA/Quality Control (QC) activities designed to achieve the data quality goals.

Quality Assurance (QA) Record—A complete document that furnishes evidence of the quality of items, activities, or credentials and has been designated as a QA record. Such records are considered to be lifetime or nonpermanent records.

Protocol—A record or document utilized to provide guidance or work direction. Some examples of protocols would be procedures, SOWs, work guides, work instructions, sampling plans, etc.

Records—Books, papers, maps, photographs, machine-readable materials, or other documentary materials, regardless of physical form or characteristics, made or received by an agency of the U.S. Government under federal law or in connection with the transaction of public business. Virtually all recorded, informational materials in the custody of the government (including information held by contractors that is considered by contract to be government information), regardless of the medium (hard copy, machine-readable, microfilm, etc.), are considered government "records."

DEFINITIONS (Continued)

Sample Delivery Group—A unit used to identify a group of samples for delivery. Each Sample Delivery Group is assigned a unique ID number.

Sampling and Analysis Plan (SAP)—A plan of action developed before implementation of field activities that describes the methods and protocols for obtaining representative portions of the environment being investigated. It also describes the methods for analysis and the required parameters.

Statement of Work (SOW)—The contractual agreement between the requesting organization and the service provider. The SOW defines the scope of work, including associated QA/QC, schedules, and deliverables.

Task Files—Files maintained at the PGDP Site Office pertaining to the site mission. A Task File is required for each task and usually pertains to a single task.

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1. INTRODUCTION

1.1 PURPOSE

This plan will be used for the Paducah Department of Energy (DOE) tasks that are involved in the collection of data. Each section of the plan was written to meet the data quality requirements set forth by the Paducah DOE Program and defined in 10 CFR 830.120 and provides a description of the programmatic elements which should occur for each task. Appendix A provides additional information concerning the quality assurance (QA) and data management aspects which are specific to the task and cannot be defined at this level. Appendix A should be completed once the task has been planned or has documented the Data Quality Objectives (DQOs). This plan, along with a completed Appendix A, will serve as the "Quality Assurance and Data Management Plan" for the task, will be provided to appropriate personnel, and will be maintained as a project record.

For the purpose of this document, Appendix A is not completed but shows the information to be completed for each task involved in the collection of data. Each task will issue the task-specific "Quality Assurance and Data Management Plan" through the designated channels.

1.2 APPLICABILITY

The requirements of this plan apply to the collection and generation of data by Paducah DOE. This plan applies to screening and definitive analytical data as defined in Section 3.2, historical data, and locationally descriptive data which includes the Geographic Information System (GIS), lithology, geophysical data, etc. Implementation for tasks is based on data collection needs and final use of the data. The requirements of this plan do not apply to data collected by the Health and Safety Program or personnel and financial data.

2. PROGRAM ORGANIZATION, RESPONSIBILITY, AND TRAINING

This information describes the basic organization, responsibility, and training requirements for tasks. Specific task plans should be developed using Appendix A as a guide to define individuals and matrix responsibilities. The task will further define training needs based on activities performed in the field.

2.1 ORGANIZATION

The DOE Project Manager and the DOE Performance Management contractor establish task scope and prioritize work to ensure the Paducah DOE Program strategic plans are accomplished. Furthermore, they serve as the primary interface to ensure that task, regulatory agency, stakeholder, and other involved organizations objectives are met. They will ensure that requirements in this plan are incorporated into various protocols and other Statements of Work (SOWs). In addition, they will ensure adequate technical support is in place for the task and that QA and safety are first priorities throughout the task life cycle.

2.2 ROLES AND RESPONSIBILITIES

The functional responsibilities of task staff members shown below relate to their involvement with the data collection and the output process. This section identifies task activities with staff members performing the work. While the descriptions are identified by title, they indicate functional responsibilities that task staff perform rather than individual staff positions.

2.2.1 Stakeholders

- **DOE Project Manager**

The DOE Project Manager has direct communication with the DOE Performance Management contractor Project Manager and is responsible for task oversight, overall compliance for the task, and submitting various reports to, and interfacing with, the Environmental Protection Agency (EPA) and the Commonwealth of Kentucky.

- **Commonwealth of Kentucky**

The Commonwealth of Kentucky is the state regulatory stakeholder for the site. Activities including remedial action, enrichment facilities, and waste management of the Paducah DOE Program are reviewed, commented upon, and approved by the Commonwealth of Kentucky.

- **EPA, Region IV**

EPA is the federal regulatory stakeholder for the Site. Activities, including remedial action, enrichment facilities, and waste management of the Paducah DOE Program are reviewed, commented upon, and approved by EPA.

- **Kentucky Agreement in Principle (AIP)**

The Kentucky AIP reflects the understanding and commitments between DOE and the Commonwealth of Kentucky regarding DOE's provision to provide to the Commonwealth technical and financial support for the Commonwealth's activities in environmental oversight, surveillance, remediation, and emergency-response activities. The AIP is intended to support nonregulatory activities. Its goal is to maintain an independent, impartial, and qualified assessment of the potential environmental impacts of present and future DOE activities at the Paducah Gaseous Diffusion Plant (PGDP).

- **Federal Facility Agreement (FFA)**

The FFA reflects the understanding and commitments between DOE, EPA, and the Kentucky Division of Waste Management regarding the comprehensive remediation of PGDP. The purpose of the FFA is to provide a set of comprehensive requirements for remediation that coordinates the cleanup provisions of both Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource, Conservation, and Recovery Act (RCRA).

2.2.2 DOE Managing and Integrating Contractor

Bechtel Jacobs Company LLC as the managing and integrating contractor is responsible for ensuring the following functions are performed either by their staff or a subcontractor.

- **Data Manager**

The Data Manager is responsible for long-term electronic storage of data, loading Electronic Data Deliverables (EDDs), electronic verification of data, and ensuring compliance to policies and protocols relating to data management. The Data Manager has overall responsibility for the design, operations, and maintenance of the databases; ensures compatibility with central Oak Ridge Environmental Information System (OREIS); serves on the OREIS Steering Committee; reviews the system performance; determines the need for changes; authorizes changes; and oversees the electronic transfer of electronic data to external agencies. The Data Manager interfaces with the Sample Manager and the Project Data Coordinator to set up the Project Environmental Measurements System (PEMS) for each task. The Data Manager oversees the completion of task-specific Data Management Plans.

- **Data Requestor**

The requestor may be a task lead or his designated representative, such as a technical lead, risk assessor, waste management coordinator, compliance coordinator, or other individual who determines the need for data to support decision making. The requestor is responsible for coordinating sample collection, sample analysis, data assessment, and decision making. If the requestor is a designated representative, the task lead has ultimate responsibility.

- **Network Administrator**

The Network Administrator is responsible for implementing the system design for the Paducah DOE Program Integrated Data System platform; coordinating necessary network and personal computer (PC) maintenance; establishing user accounts to the network; and performing daily backups to system data.

- **Project Data Coordinator/Data Management Team**

The Project Data Coordinator/Data Management Team is responsible for ensuring that the requirements relating to data management are met for the task. This includes accumulation of historical data, control of data generated by field activities or as a result of lab analyses, and storage of data as part of the task. The Project Data Coordinator ensures that all data are entered into PEMS. The Project Data Coordinator works with the Data Manager and the Sample Manager to ensure consistency throughout the task data, with other task's data, and the data systems in place. The Project Data Coordinator is responsible for data entry verification; assisting with the data evaluation and review process; data updates and deletions, as authorized by the Data Manager; and performing electronic transfer of data files from electronic data laboratory deliverables to the Paducah DOE Program Integrated Data System.

- **Project Manager**

The Project Manager has direct responsibility for the overall task oversight, including budget, schedule, and milestones. This responsibility includes the management of strategic planning, safety, quality, task activities, and for the successful completion of task assignments within budget and on schedule. The Project Manager ensures that implementation of the QA and Data Management Programs is consistent with guidelines and ensures requirements are adhered to, as stated in this plan. The Project Manager reports to the Bechtel Jacobs Company Manager of Projects and interfaces with DOE and the task team.

- **Task Team**

The Task Team is made up of personnel (i.e., Project Manager, Task Manager, Task Lead, Quality Engineer, Sample Manager, Data Manager, Technical Manager, Field Team Leader, and other field personnel) responsible for a specific task. The team is responsible for the data collection planning; fieldwork; sampling and analysis; data review; and decision making for a set task.

- **Quality Engineer**

The Quality Engineer is responsible for the overall QA concerns of the data and system functions relating to a task. The Quality Engineer is involved in the planning and review of data to ensure that data quality requirements are met. The Quality Engineer is also responsible for helping prepare QA plans, work agreements, protocols, and documents to establish and implement requirements, performing assessments, providing guidance/assistance in resolving quality problems, and ensuring that corrective action is taken and appropriately documented.

- **Records Clerk**

The Records Clerk is responsible for entering records; indexing data into Data Management System (DMS) records; indexing tables; assisting with the records storage and retrieval process; and performing data updates and deletions as authorized by the Records Manager.

- **Records Manager**

The Records Manager is responsible for maintaining all pertinent and required records associated with operating the DMS and preserving the data; determining which records must be stored and the storage requirements; establishing a records classification, inventory, and indexing system; maintaining the DMS records indexing tables; implementing a records storage and retrieval system; and coordinating with the Data Manager and Sample Manager to establish pointers to data processing records and associated metadata (e.g., laboratory data packages, regulatory documents, QA requirements, and program plans).

- **Project Records Coordinator**

The Project Records Coordinator is responsible for the task records. Duties include all activities relating to identification, acquisition, classification, indexing, and storage of task records related to field activities. The task records include data documentation materials; plans and protocols; and all task file requirements. Upon completion of the task, the Project Records Coordinator transmits all task files to the Paducah Document Management Center (DMC).

- **Release Requestor**

The Release Requestor is identified as the person who requests the release of data to an external agency. This responsibility could be filled by several different roles including, but not limited to, the Task Lead or the Technical Manager.

- **Sample Manager**

The Sample Manager is responsible for working with the Task Lead to develop specific analytical requirements for the task, interfacing with the Oak Ridge Sample Management Office (SMO) for procurement of laboratory services, contracting validation services, and coordinating contractual screening. The Sample Manager works with the task team to resolve issues identified during contractual screening or electronic data review of the data with the laboratory. The Sample Manager interfaces with the Data Manager, the Project Data Coordinator, and the task team.

- **Task Lead**

The Task Lead is responsible for direct task coordination, issuing technical reports, and maintaining the task is on schedule and within the budget. The Task Lead coordinates all team personnel working on the task and communicates regularly with the Task Team personnel on the status of task budgets and schedules; assuring all protocols are followed; deliverables are met; and that any issues or concerns associated with the task are properly addressed. The Task Lead ensures that implementation of the QA and Data Management Programs is consistent with guidelines and ensures requirements are adhered to as stated in this plan. The Task Lead reports to the Task Manager and interfaces with the task team.

- **Task Manager**

The Task Manager is responsible for ensuring that the proper resources are available and that personnel are appropriately trained for the assigned task. The Task Manager ensures that all requirements and protocols for the task are followed and that they are consistent with the overall mission of the Environmental Management and Enrichment Facilities (EMEF) Program. The Task Manager also ensures that implementation of the QA and Data Management Programs is consistent with guidelines and ensures requirements are adhered to as stated in this plan. The Task Manager reports to the Project Manager and interfaces with the Task Lead.

- **Technical Manager/Subcontractor Technical Representative**

The Technical Manager/Subcontractor Technical Representative is responsible for providing technical support and guidance to the task. This includes field observations and oversight of subcontractors, generating reports/documents, and making decisions regarding technical issues (i.e., sample locations, analytical methods, etc.).

2.3 TRAINING

Personnel assigned to the task, including field personnel and subcontractors, will be trained to perform the tasks to which they are assigned. Training requirements are defined in the task-specific SOWs and plans.

3. QA OBJECTIVES FOR MEASUREMENT DATA

QA objectives, for the purposes of this plan, apply to measurement data only. Other data (such as locationally descriptive information) is discussed in Section 8.

3.1 DQOs

DQOs are statements developed by data users to specify the quality of data from field and laboratory data collection activities to support specific decisions or regulatory actions. DQOs are qualitative and quantitative specifications that are used to design a study that will limit uncertainty to an acceptable level. The DQOs describe what data is needed, why the data is needed, and how the data will be used to address the problems being investigated. DQOs also establish numeric limits to ensure that data collected is of sufficient quality and quantity for user applications.

The DQO process is a planning tool based on the scientific method that clearly identifies a problem; the decisions to be made to address the problem; and the type, quantity, and quality of data needed to support the decision making. The DQO process may be applied in modified form to any data collection activity. The DQO process balances risks with costs in selecting the most appropriate data collection plan. When applicable, various regulatory agencies (i.e., EPA, Kentucky Department for Environmental Protection, etc.) may participate in the DQO sessions.

Specific DQOs and Sampling and Analysis Plans (SAPs) for tasks are developed per PMSA-1001 and will be documented in Appendix A.

3.2 ANALYTICAL DATA CATEGORIES

Two descriptive data categories have been specified by EPA in the *Data Quality Objectives Process for Superfund, Interim Final Guidance*, EPA/540/G-93/071 (EPA, 1993). These two data categories supersede the five quality control (QC) levels (Levels I, II, III, IV, and V). The two new data categories are associated with specific QA/QC elements and may be generated using a wide range of analytical methods. The type of data generated will be based on the qualitative and quantitative DQOs. The two data categories are:

Screening data—Measurements generated through the use of field- or fixed-laboratory methods in which the level of certainty in the data cannot be determined given physical evidence documenting the acquisition and analysis of the sample. Analytical methods producing field measurements or screening data include those that indicate the presence or absence of an analyte, or class of analytes, or provide a semiquantitative (estimated) result. Field measurement and other screening data include, but are not limited to, Draeger tubes; organic vapor analyses; soil gas surveys; and radiation and contamination monitoring. Screening data results must be confirmed by collecting a specified percentage of definitive data. Screening data should be used conservatively and not rule out the presence of a contaminant without some percentage of the data being confirmed by definitive data.

Definitive data—Analytical measurements for which the presence and corresponding concentration of the target analyte(s) can be determined with a known degree of certainty. The measurements are supported with appropriate physical evidence documenting the acquisition and analysis. Definitive data, in electronic form, must be supported with retrievable, but not necessarily retrieved, physical evidence in the laboratory. This evidence can include analytical results, QA/QC results, chains-of-custody (COCs), logbooks, standards information, etc.

Definitive data, or a combination of screening data, definitive confirmation, and definitive data, will be collected when the task is implemented. A minimum of ten percent of the screening samples will also be analyzed by a fixed-base laboratory using EPA SW-846 Methods (1986) to provide the required definitive data. When not available, other nationally recognized methods such as those of the American Society for Testing and Materials (ASTM), DOE, and EPA, will be used.

Applicable task documents summarize the data uses, data users, data categories, and data deliverable QC levels for each of the media and sample types that will be collected during the investigation.

4. APPLICABLE PROTOCOLS AND DOCUMENTS

Company protocols, sampling methods, administrative procedures, etc., utilize hierarchy documents that relate to data quality. Hierarchy documents such as EPA Quality Assurance Management Staff (QAMS) 005/80, *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, *EPA Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, and *Environmental Data Management Implementation Handbook for the Environmental Restoration Program (ES/ER/TM-88/R1)* are used as flow-down documents in writing company protocols. Deviations are documented as described in Section 16. Protocols and documents applicable to the processes described will be defined in completion of Appendix A.

5. SAMPLE CUSTODY

COC is a process used to document the transfer of custody of samples from one individual to another from sample collection until final disposition. COC records are handled in accordance with applicable protocols. COC requires signature transfer of samples from sampling personnel to the sample custodians, who then transfer samples to the appropriate analytical laboratory personnel. The transfer of samples between individuals in the same work group located in the same general location (sampling or analytical) does not require a signature transfer since the integrity of the sample is maintained at all times. If the individuals are not in the same general location, a COC is required. This is accomplished by the samples being locked in a refrigerator when laboratory personnel are not available. Sample residuals are disposed of only after notification by the Task Lead that they no longer need archiving or once holding times have been exceeded. Sample custody protocols are identified in Appendix A.

6. CALIBRATION PROTOCOLS AND FREQUENCY

6.1 FIELD EQUIPMENT CALIBRATION PROTOCOLS AND FREQUENCIES

The calibration of field instruments will be checked in the field in accordance with manufacturer's specifications. Field calibration records will be documented in logbooks and/or on field data sheets. Calibration frequencies for field instruments will be defined in Appendix A.

6.2 LABORATORY CALIBRATION PROTOCOLS AND FREQUENCIES

The laboratory(ies) will use written, standard protocols for equipment calibration and frequency. These protocols are based on EPA guidance or manufacturer's recommendations and are given in the EPA-approved analytical methods. Supplemental calibration details, such as documentation and reporting requirements, are given in the laboratory QA Plan. The laboratory QA Plan will be reviewed and approved as part of the contract review process. When available, standards used for calibration will

be traceable by the National Institute of Standards and Technology. Corrective action protocols for malfunctioning equipment will be addressed in the laboratory QA Plan. Calibration records, in accordance with the laboratory QA Plan, will be maintained for each piece of measuring and test equipment and each piece of reference equipment. The records will indicate that established calibration protocols have been followed. Records of equipment use will be kept in the laboratory files.

7. ANALYTICAL PROTOCOLS

When available and appropriate for the sample matrix, SW-846 Methods will be used. When SW-846 Methods are not available or lower detection limits that are required cannot be achieved by SW-846 Methods, other nationally-recognized methods such as those of ASTM, DOE, and EPA will be used. Analytical methods, detection limits, sample preservation, holding times, and container requirements for field measurements and analytical parameters are defined during the DQO process and are incorporated in the analytical SOW for the task and applicable protocols and will be defined in Appendix A.

8. DETAILS OF DATA AND DOCUMENT FLOW

The components of data management include planning, collection, review, archival, and transmittal. Task activities follow identical paths to meet data management requirements. A flow chart (Figure 1) and narrative (Sections 8 and 9) are provided for each component of data and document flow. The Paducah DOE Program Integrated Data System is discussed first. The data system is core to each of the data management components.

8.1 INTEGRATED DATA SYSTEM

The Paducah DOE Program Integrated Data System provides a centralized system for management and storage of environmental information while allowing easy, yet controlled, access. The basis for the Paducah DOE Program Integrated Data System is to establish and maintain a program to provide the most efficient system of data collection, analysis, storage, and retrieval. DOE, as specified in the FFA, is to maintain one consolidated database for the Paducah Site. All data collected under this agreement (the FFA) is to be routinely submitted electronically in a consistent format to the stakeholders (see Section 9.2 and Appendix B). In addition, under the Kentucky AIP, AIP personnel require access to the electronic data that is maintained by the Paducah facility and its contractors. Consequently, the Paducah DOE Program Integrated Data System meets the regulatory requirements and provides Paducah EMEF with a platform to manage its data.

The Paducah DOE Program Integrated Data System is composed of integrated hardware and software to support the collection, management, analysis, and presentation of data associated with environmental restoration/remedial action, compliance, and monitoring activities at PGDP. All environmental measurements, analyses, and locationally descriptive information (e.g., GIS, lithology, and monitoring structure information), as applicable per this plan, is included. In addition, an extensive collection of descriptive and reference information about environmental tasks and permits is stored. A flow diagram for the Paducah DOE Program Integrated Data System is shown in Figure 2.

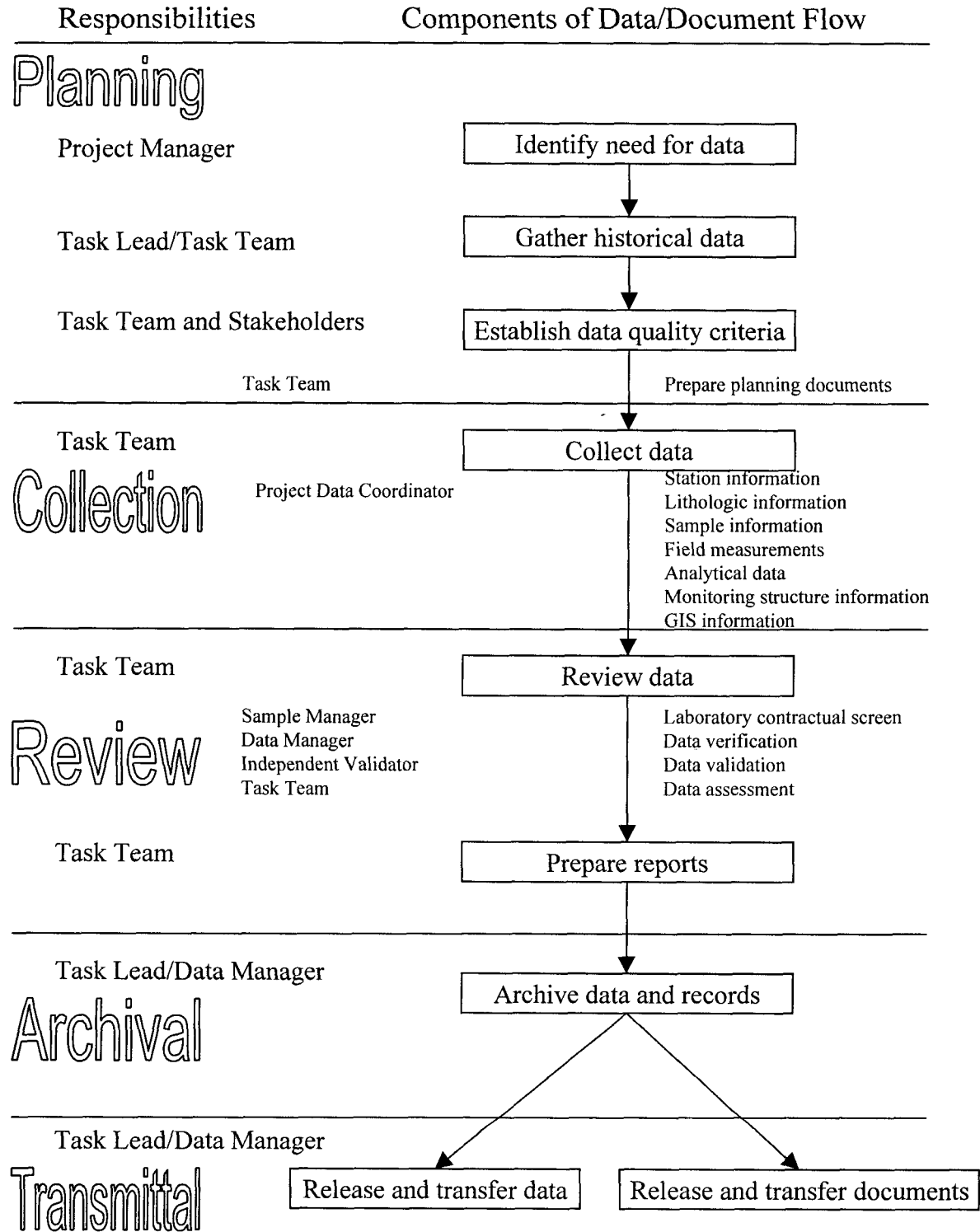
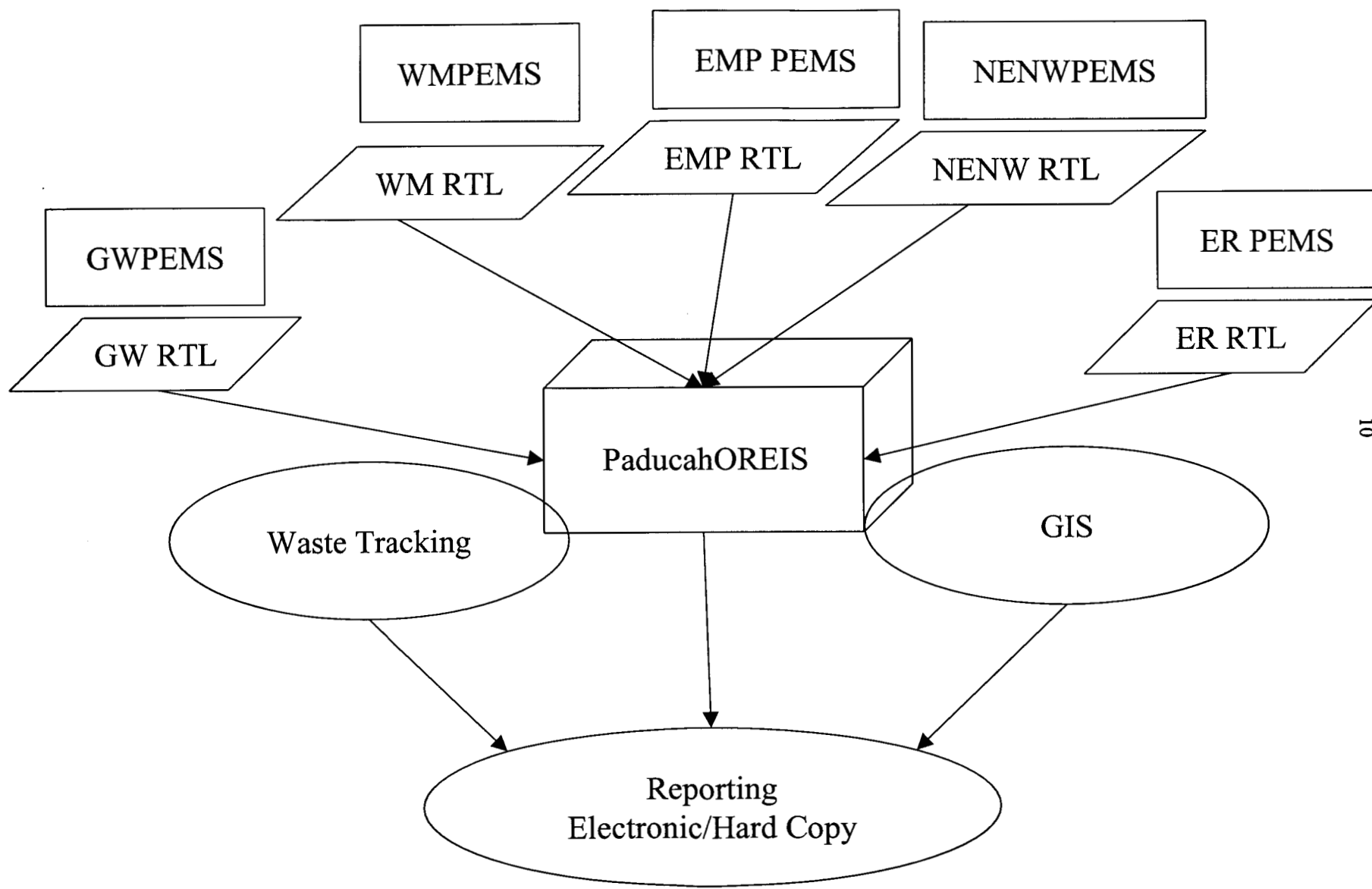


Figure 1. Detail of Data and Data Flow.

Figure 2. Paducah DOE Integrated Data System.



As part of the Paducah DOE Program Integrated Data System, each project utilizes a PEMS for sample scheduling, collection, and tracking each sample and associated data from point of collection through final data reporting. Each PEMS is established on a project-specific basis. PEMS tracking includes field forms, COCs, hard copy data packages, and EDDs. Project data is entered as the project progresses. All field measurement data, analytical data, lithologic descriptions, monitoring structure information, sample stations, and corresponding coordinates (as appropriate) are entered into PEMS.

Upon completion of the project, or on a routine basis, data from each PEMS is reviewed as described in Section 8.4 and transferred to Paducah OREIS for permanent retention. All final data reporting is reported from Paducah OREIS. Additionally, PEMS data is archived on a specified frequency to ensure data traceability.

The Paducah DOE Program Integrated Data System is accessed by a computer network. The system is designed to allow the electronic transfer of information between all branches of EMEF. A central file server is used to maintain the software and database applications. This server may be accessed from several PC workstations within the computer network.

8.2 DATA PLANNING

8.2.1 Initiation of Data Collection

The need for data collection is determined by the Task Lead and Project Manager to satisfy applicable regulatory requirements and/or DOE Orders. The Task Lead identifies the need for collection of data to support the task and is responsible for the development of applicable documents that outline the specific objectives of the data collection activity.

8.2.2 Historical Data Gathering

A substantial effort should be made by the data requestor (i.e., project manager/task lead) to acquire and analyze all historical data and documents relevant to the task (i.e., in numeric, spatial, attribute, and textual form) prior to the DQO process and/or data generation. For example, these documents and data might include prior work done for preliminary assessments, site characterization tasks, remedial investigations, annual monitoring reports, or data summaries provided by previous analysts. In addition, information specialists who would know of relevant documents, GIS information, and data sets should be consulted to acquire a comprehensive task background. In many cases, descriptive and qualitative information about the data (e.g., metadata) may be required. This is often the case with electronic files that may be received without the basic information provided through proper documentation. Some research may be required to prepare these metadata statements which are essential to the determination of data quality and usability.

If the data is in electronic form, the usable data and metadata should be entered into the Paducah DOE Program Integrated Data System for inclusion into Paducah OREIS. If the data is in document form, the usable data and metadata should be extracted and key-entered into the Paducah DOE Program Integrated Data System. If GIS information is required, themes/coverages should be updated as necessary.

8.2.3 Data Quality Criteria

With the usable historical data now in the Paducah DOE Program Integrated Data System, the data, along with the documents and metadata, can be retrieved, analyzed (both statistically and spatially), modeled, and used in support of DQOs for the task. This data, along with elements from the DQO process such as, contaminants of concern, QA/QC requirements, “Identification of Project Data Quality Checks” checklist, data review options, and the sampling design is used to generate applicable plans.

Field SOWs, sampling plans, and analytical SOWs are developed in support of field preparation. A field SOW describes the field activities to be undertaken and subsequent work to be performed. A sampling plan may be used to further expand on details of field activities. An analytical SOW is prepared which includes analytical parameters, methods, and detection limits. A validation SOW is also prepared when validation services are required to ensure the analytical laboratory’s performance is acceptable.

Information from each of the SOWs and sampling plans is used to initiate sampling logbooks, labels, and other required field documentation. Documentation generated by the data collection activity shall be forwarded electronically and/or in hard copy to the Task Lead and the DMC to be indexed and filed as specified per the SOW.

8.3 DATA COLLECTION

Data collection information is recorded and maintained for all data collection activities. This information includes station information, lithologic information, sample information, field measurements, analytical data, monitoring structure information, and GIS information and is explained below.

8.3.1 Station Information

Station information is data describing the location from which a sample is taken. Station information includes plant coordinates (surveyed or estimated, as appropriate), station description, and station type. This information is input directly into PEMS. Methods for determining coordinates and relevant information necessary to determine and document accuracy should be recorded.

8.3.2 Lithologic Information

Lithologic information is data describing the lithology of a borehole. This information is input directly into PEMS.

8.3.3 Sample Information

Sample information is environmental data describing the sampling event and consists of the following: station, date collected, time collected, and other sampling conditions collected for every sampling event. This information is recorded in logbooks and may be included on the COC or sample labels. This information is input directly into PEMS.

8.3.4 Field Measurements

Field measurements are measurements of a parameter without physical collection of a sample which are collected real-time in the field. Field measurements may include water level measurements, pH, conductivity, flow rates, temperature, and dissolved oxygen. Field measurements are taken and recorded on appropriate field forms or in logbooks, and input into PEMS.

8.3.5 Analytical Data

The Sample Manager tracks progress of analytical samples as fieldwork continues. COCs are reviewed and lab receipt of samples is verified. Once samples have entered the laboratory, the laboratory is responsible for sample analysis, data reduction, and data reporting. The analytical data will be checked for completeness and reasonableness. A system is set up within the Paducah DOE Program Integrated Data System to log shipment of samples and receipt of data packages.

All data packages received from the fixed-base and screening/field laboratories are tracked, reviewed, and maintained in a secure environment. The primary individual responsible for these tasks is the Sample Manager. The following information is tracked: sample delivery group number, date received, number of samples, sample analyses, receipt of EDD (if applicable), and comments. The Sample Manager compares the contents of the data package with the COC form and identifies discrepancies. Discrepancies are immediately reported to the laboratory and the data validators. All data packages are forwarded to the Bechtel Jacobs Company EMEF DMC for permanent storage.

8.3.6 Monitoring Structure Information

Monitoring structure information is data describing the monitoring wells and boreholes installed during the combined tasks. Information includes well screen depth; borehole and well diameter; screened aquifer; and datum information. This information is input directly into PEMS.

8.3.7 GIS Information

GIS information is metadata that is visually descriptive of the area around the location of a project. Information may include maps of roads, streams, underground utilities, etc. Projects creating new GIS information or causing required updates to existing GIS information supply the information to the Paducah DOE Program Integrated Data System.

8.4 DATA REVIEW

8.4.1 Laboratory Contractual Screening

Laboratory contractual screening is the process of evaluating a set of data against the requirements specified in the analytical SOW to ensure that all requested information is received. The contractual screening includes, but is not limited to, the COC, number of samples, analytes requested, total number of analyses, methods used, QC samples analyzed, EDDs, units, holding times, and reporting limits achieved.

The Sample Manager conducts the screening upon receipt of data from the analytical laboratory. To the extent possible, the contractual screening should be done electronically. The Sample Manager identifies and documents any exceptions to the SOW on a Laboratory Deliverable Contractual Screening Checklist.

8.4.2 Data Verification

Data verification is the process for comparing a data set against a set standard or contractual requirement. Verification may be performed electronically, manually, or by a combination of both. Data verification includes contractual screening and can include other data quality checks established by the task team. Applicable task plans define the specific verification to be performed. Data is flagged as necessary.

Specific documentation associated with data verification is developed per PMSA-1001, Appendix G, entitled, "Identification of Project Data Quality Checks," and will be provided in Appendix A.

8.4.3 Data Validation

Data validation is the process for evaluating the laboratory adherence to analytical-method requirements. This is performed by a qualified individual for a data set, independent from sampling, laboratory, project management, or other decision-making personnel for the task. Data validation is performed according to PMSA-1001 and is coordinated by the Sample Manager. Validation qualifiers are stored in the Paducah DOE Program Integrated Data System. Documentation associated with data validation (the validation SOW, data validation reports, and exception reports, if applicable) is filed in the DMC. Specific documentation associated with data validation is identified in Appendix A.

8.4.4 Data Assessment

Data assessment is the process for assuring that DQOs are met, and that the type, quality, and quantity of data are appropriate for their intended use. It allows for the determination that a decision (or estimate) can be made with the desired level of confidence given the quality of the data set. Data assessment follows data verification and data validation and must be performed on 100 percent to ensure data is usable.

The data assessment is conducted by a designated task team member in conjunction with other task team members according to PMSA-1001. Assessment qualifiers are stored in the Paducah DOE Program Integrated Data System. Data is made available for reporting upon completion of the data assessment and associated documentation (Data Assessment Review Checklist) is filed with the task files.

8.4.5 Report Preparation

Personnel will utilize the official Paducah OREIS data tables for all official data reporting. Prior to the release of any data, the "Data Release" form shall be completed according to PMSA-1001, Appendix I. Release of all data shall be approved by DOE and the Managing and Integrating Contractor.

8.5 DATA AND RECORDS ARCHIVAL

8.5.1 Data Archival

Data archival refers to the long-term storage of electronic data generated by a task in the Paducah DOE Program Integrated Data System. Long-term storage in a central repository assures maximum accessibility by the environmental engineering community. To ensure its future usability, sufficient documentation, including the associated metadata, must accompany archived data to describe the source, contents, and structure of the data. Paducah OREIS is the database that stores archived data for future use. In addition, the Paducah PEMS used for the task is archived both intact and as exported ASCII text with sufficient documentation to recreate task data. The archive of Paducah PEMS, as well as the back-ups for Paducah OREIS, are stored in the DMC.

8.5.2 Records Archival

The DMC is a repository for all EMEF documents and data. Each EMEF task transmits a copy of all task documentation to be filed in the DMC as the task file. This information is arranged by a file classification scheme and is filed on shelves in color-coded folders. The documents are shelved in mobile file cabinets which are located inside a two-hour-rated firewall vault. The vault is protected by a wet-pipe sprinkler system and intrusion alarm. The DMC staff utilizes the DMS, a database management system designed for management and retrieval of documents, to perform searches. DMS records contain bibliographic information (title; author; issue date; document type and number; etc.), file classification information (document location), and index information (subject keywords, document status, facility name/waste area grouping [WAG]/solid waste management unit [SWMU] number, cleared for public use flag, and administrative record [AR] codes).

By utilizing the DMC, all documents relevant to EMEF work will be located in a central repository and will be available to the EMEF organization as well as other identified users. The DMC will also provide controlled access to these documents.

Information that may be found in a task file include hard copies of all original field and analytical results; data reduction and summarization programs; data packages; logbooks; associated QA/QC forms; correspondence; contracts; meeting minutes; training records; plans; and reports. All contents of a task file are classified, indexed, and stored into appropriate file groups and record series within the task file.

Satellite document centers are sometimes established with routine transfer frequencies to the PGDP DMC. Task records are maintained by the Task Records Coordinator as record copy as specified in task data and document management plans and as required by protocol. Logbooks and field documentation are copied weekly unless maintained as record copies, which are kept in one-hour-rated, fire-resistant, locked file cabinets overnight. If the activities during logbook use could potentially damage the logbook or result in loss, then weekly copies are required. If copies are made, they are maintained separate from the original logbook and are forwarded to the task files and maintained as record copy until the originals are complete. At that time, the originals replace the copies as record copy. The record copy is transferred to the Paducah EMEF DMC. Upon completion of the task, all original logbooks (field and analytical), field documentation, and project deliverables will be forwarded to the DMC by the task manager or designee.

Documents will be selected for the AR from the task file. The AR files are duplicated and made available to the public at the Environmental Information Center. Documentation associated with data and records archival includes archive checklists; indexed and filed copies of all relevant hard copies; and lists of all items recommended for the AR file.

9. DOCUMENT AND DATA RELEASE AND TRANSFER

9.1 DOCUMENT RELEASE AND TRANSFER

A standard distribution list is maintained for regulatory documents submitted according to the FFA. Changes to this distribution list should be submitted through the DOE Site Office. Other documents generated for the EMEF Program may be specially requested through the DOE Site Office or their designee. Requested documents may be historical or newly generated and will be transmitted within a reasonable time frame.

9.2 ELECTRONIC DATA RELEASE AND TRANSFER

Once data has undergone verification, validation, and data assessment, it may be released to external agencies. Routine data or data specially requested by external agencies is downloaded into a standard format (see Appendix B) and transmitted either electronically or by physical transfer on electronic media (diskettes, etc.). If data is transmitted electronically, data files will be placed on an externally-accessible file server that is password protected. The external agency has the responsibility to protect the data that has been provided. Passwords shall not be shared with anyone outside the external agency. External agencies will be notified of data availability via electronic mail.

The Task Lead/Release Requestor will complete the "Paducah EMEF Data Release to External Agencies" form and obtain all appropriate signatures. Field QC data is not routinely transmitted with the data; however, this information is available upon request. Electronic data formats will contain a "Read Me" file that will identify the electronic data package and the number of files associated with the package. The "Read Me" file will also indicate the appropriate data qualifiers along with their associated definitions and the appropriate data quality level. Hard copy data formats will contain a cover letter that will identify the contents of the data package. The cover letter will also indicate the appropriate data qualifiers along with their associated definitions and the appropriate data quality level.

9.2.1 DOE Remedial Action Investigations

DOE will provide electronically-transmitted data concurrent with the D1 Report/Characterization Report or when the Project Completion Report is issued (if formal D1 is not required) for remedial action investigations.

9.2.2 DOE-Permitted Facilities/Routine Environmental Monitoring Reports

Permitted and routine sampling is outlined in Table 8.1. Additionally, Table 8.1 includes reporting and transfer frequencies. DOE will provide electronic-transmitted data per the agreed schedule in this document.

9.2.3 Special Requests

Data will be transmitted routinely as specified in Sections 9.2.1 and 9.2.2. Any additional data generated from sampling activities that are available electronically may be transmitted upon receipt of a special request correspondence. Special requests shall be submitted through the DOE Site Office, or their designee, specifying the sampling event information required.

Table 8.1. Regulatory and routine sampling.

PROGRAM	FREQUENCIES/SCHEDULE		
	SAMPLING	REPORTING	TRANSFER
Permit-Associated Sampling			
Kentucky Pollutant Discharge Elimination System Permit DOE Outfalls	Monthly and Quarterly	Monthly 28 th of each month	Monthly 28 th of each month
Toxicity Monitoring	Quarterly	Quarterly Publication of the ASER	Quarterly Concurrent with ASER
Bioaccumulation Study	Annually	Annually Publication of the ASER	Annually Concurrent with ASER
Fish Community	Semiannually	Annually Publication of the ASER	Annually Concurrent with ASER
C-746-K Surface Water	Quarterly	Semiannually June 30, December 30	Semiannually June 30, December 30
C-746-S&T Surface Water	Quarterly	Quarterly January 15, April 15, July 15, October 15	Quarterly January 15, April 15, July 15, October 15
C-746-U Surface Water	Quarterly	Quarterly January 15, April 15, July 15, October 15	Quarterly January 15, April 15, July 15, October 15
C-746-K Groundwater	Quarterly	Semiannually June 30, December 30	Semiannually June 30, December 30
C-404 Landfill Groundwater	Quarterly	Semiannually May 30, November 30	Semiannually May 30, November 30
C-746-S&T Landfill Groundwater	Quarterly	Quarterly February 30, May 30, August 30, November 30	Quarterly February 30, May 30, August 30, November 30
C-746-U Groundwater Monitoring	Quarterly	Quarterly February 30, May 30, August 30, November 30	Quarterly February 30, May 30, August 30, November 30
Environmental Monitoring Programs (EMP)			
EMP Surface Water Sampling	Bimonthly	Annually Publication of Annual Site Environmental Report (ASER)	Annually Concurrent with ASER
EMP Annual Sediment Sampling	Annually	Annually Publication of ASER	Annually Concurrent with ASER
EMP Annual Deer Sampling	Annually	Annually Publication of ASER	Annually November
Plume Groundwater Sampling	Monthly and Quarterly	Quarterly January 30, April 30, July 30, October 30	Quarterly January 30, April 30, July 30, October 30
Residential Groundwater Sampling	Monthly, Quarterly, and Annually	Annually Publication of ASER	Semiannually April and October
Surveillance Groundwater Sampling	Monthly, Quarterly, and Annually	Annually Publication of ASER	Semiannually January and July

PROGRAM	FREQUENCIES/SCHEDULE		
	SAMPLING	REPORTING	TRANSFER
Surveillance & Maintenance or Operation & Maintenance Activities			
C-404 Leachate	Per Permit As needed	Per Permit January 30, April 30, July 30, October 15	Annually * October 15
C-746-S&T Leachate	Per Permit As needed	Quarterly per permit	Quarterly per permit
C-746- U Leachate	Per Permit As needed	Quarterly per permit	Quarterly per permit
Northwest Plume/Northeast Plume	Daily	Quarterly and Annually January 30, April 30, July 30, October 30	Quarterly January 30, April 30, July 30, October 30

* If leachate samples were collected.

10. INTERNAL QC CHECKS

10.1 FIELD QC SAMPLES

Standard operating protocols are used for all routine sampling operations. Field QC sampling will be conducted to check sampling and analytical accuracy and precision for both laboratory and field analyses of the original samples. All QC samples will be handled, shipped, and analyzed as stated in Sections 5 and 7. Field QC samples will have sample numbers which are unique and which identify them as QC samples.

A **filter blank** is a sample of ASTM Type II water passed through, or over, a filter before any samples are filtered. Filter blanks are used as a measure of filter contamination. Samples are analyzed for the same parameters as the filtered sample. Filter blanks can be collected at a rate of one per lot number.

Field blanks serve as a check on environmental contamination at the sample site. ASTM Type II water is transported to the site, opened in the field, transferred into each type of sample bottle, and returned to the laboratory for analysis of all parameters associated with that sampling event. It is also acceptable for field blanks to be filled in the lab, transported to the field, and then opened. Field blanks may be used as a reagent blank as needed. It is recommended that field blanks be collected at a rate of 1:20.

Equipment blanks (may also be referred to as equipment rinseates) are samples of ASTM Type II water passed through decontaminated sampling equipment. Equipment blanks are used as a measure of decontamination-process-effectiveness and are analyzed for the same parameters as the sample collected with the equipment. Equipment blanks may also be used as a reagent blank as needed. Equipment blanks are required only when nondisposable equipment is being used. It is recommended that equipment blanks be collected at a rate of 1:20.

A **trip blank** is a sample used to detect contamination by volatile organic compounds (VOCs) during sample shipping and handling. Trip blanks are 40 mL volatile organic analysis (VOA) vials of ASTM Type II water that are filled in the laboratory, transported to the sampling site, and returned to the laboratory with VOA samples. Trip blanks are not opened in the field. One trip blank is to accompany each cooler containing VOA samples. Each trip blank is to be stored at the laboratory with associated samples, and analyzed with those samples. Trip blanks are only analyzed for VOCs.

Duplicates are two separate samples taken from the same source during the same sampling event and are analyzed for the same parameters. Data generated by duplicate samples includes sampling and analytical variability (precision). It is recommended that duplicates be collected at a rate of 1:20.

10.2 ANALYTICAL LABORATORY QC SAMPLES

Fixed-based analytical laboratories that provide services will have an approved QA plan that describes the laboratory QC sample program and the laboratory control sample program. The analytical laboratory has an established internal QC program that is managed by the laboratory supervisors. Analytical laboratory QC samples will be analyzed as required by the analytical method for the parameters of interest and the results will be included in the analytical report. Blind samples are samples in which the laboratory has no information on the sample location and, subsequently, would have no indication of the possible analytical results. These samples will be analyzed for the parameters of interest and the results will be included in the analytical report. Acceptable completion of the blind samples provides an indication of the laboratory's performance. DOE laboratories participating in the blind sample program will follow blind submittal frequencies determined by the SMO.

11. AUDITS AND SURVEILLANCES

11.1 AUDITS

Audits are qualitative reviews of task activity to check that the overall QA program is functioning. Audits should be conducted early in the task so that problems can be corrected quickly. The audit involves the review of all available and relevant task and contract documents and includes an evaluation of QC measures for office and field. Audits will be performed as requested by management.

11.2 SURVEILLANCES

Surveillances follow the same general format as an audit but are less detailed and require a less formal report. A surveillance is designed to give task staff rapid feedback concerning QA compliance and to facilitate corrective action. Surveillances will be performed as requested by management.

12. PREVENTIVE MAINTENANCE

Equipment is an inclusive term for tools, gauges, instruments, and other items. The equipment discussed in this section requires that specific preventive maintenance is serviced as specified by the manufacturer's recommended schedule. All services are documented and performed by qualified and trained individuals. Out-of-service equipment is controlled to prevent inadvertent use and its maintenance is recorded. A list is maintained of the critical, spare parts that should be stocked to minimize equipment downtime. Specific field equipment preventive-maintenance practices, frequencies, and spare parts are described in the factory manual for each instrument.

Preventive-maintenance protocols for laboratory equipment and instruments are provided in laboratory QA plans. All maintenance activities will be recorded in maintenance logs. Laboratories will be required to maintain an adequate inventory of spare parts and consumables to prevent downtime as a result of minor problems.

13. SPECIFIC ROUTINE PROTOCOLS

The precision, accuracy, and completeness parameters are quantitative tools by which data sets can be evaluated. These parameters can help ensure that DQOs are met and are defined as follows:

- **Precision**—A quantitative measurement of the variability of a group of measurements as compared to their average. Usually expressed as a percentage or a standard deviation, it evaluates the reproducibility of the system. Sample duplicates measure the reproducibility of the sampling event, while lab replicates measure the precision of the analytical process. The acceptable precision may be defined by the laboratory method used.
- **Accuracy**—A quantitative measurement of the bias of the data. It represents how close the measurement data is to the true value. Analytical accuracy is measured by percent recoveries associated with the laboratory analytical control spikes (blank spikes), surrogate spikes, or matrix spikes. The acceptable accuracy may be defined by the laboratory method used. Sampling accuracy can be assessed by evaluating field and trip blanks.
- **Representativeness**—A qualitative measurement of the ability of a sample or group of data to adequately describe or define the conditions being measured. Precision, accuracy, and completeness all affect representativeness. Sampling strategy (location, method, and frequency) are critical to ensure that the samples statistically represent the population. Laboratory precision and accuracy reflect how representative the data is of the sample.
- **Completeness**—A quantitative measurement of the percentage of acceptable data as compared to the number planned. Both sampling and analytical completeness can be measured.
- **Comparability**—A qualitative measurement of the confidence with which one data set can be compared with another. Comparability is achieved by using standard techniques for collection and analysis.

Protocols for assessing the precision, accuracy, and completeness are provided in the following text. It should be noted that there are no standard guidelines available for representativeness and comparability.

13.1 PRECISION

To determine the precision of the laboratory analysis, a routine program of replicate analyses, in accordance with the analytical method requirements, is performed by the laboratory. The results of replicate analyses are used to calculate the relative percent difference which is used to assess laboratory precision.

For replicate results C_1 and C_2 :

$$\text{Relative percent difference} = \frac{|C_1 - C_2|}{\left(\frac{C_1 + C_2}{2}\right)} \times 100$$

Precision of the total sampling and analytical measurement process will be assessed from field duplicates. Although a quantitative goal cannot be set due to sample variability, the Task Lead will review relative percent difference values of field duplicates to estimate precision. Analytical precision can be measured separately from sampling precision through the use of laboratory duplicate and matrix spikes.

13.2 ACCURACY

To determine the accuracy of an analytical method and/or the laboratory analysis, a periodic program of sample spiking is conducted (minimum one spike and one spike duplicate per 20 samples). The results of sample spiking are used to calculate the QC parameter for accuracy evaluation, the percent recovery (% R).

For surrogate spikes and QC samples:

$$\%R = \frac{C_s}{C_t} \times 100$$

where--

C_s = measured spiked sample concentration (or amount)

C_t = true spiked concentration (or amount)

For matrix spikes:

$$\%R = \frac{|C_s - C_o|}{C_t} \times 100$$

where--

C_s = measured, spiked sample concentration

C_o = sample concentration (not spiked)

C_t = true concentration of the spike

Accuracy of the total sampling and analytical measurement process will not be determined. This would require the addition of chemical-spiking compounds to the samples in the field.

13.3 COMPLETENESS

To determine the completeness of data, the percentage of valid, viable data obtained from a measurement system is compared with the number of total measurements. The goal of completeness is to generate a sufficient amount of valid data to satisfy task needs.

Completeness, C , is calculated as follows:

$$\% C = \frac{\text{Number of valid measurements}}{\text{Number of total measurements}} \times 100$$

14. NONCONFORMANCES AND CORRECTIVE ACTIONS

Nonconforming equipment, items, activities, conditions, and unusual incidents that could affect compliance with task requirements will be identified, controlled, and reported in a timely manner. Nonconforming equipment will immediately be labeled or tagged, and segregated, if possible. Specific protocols for controlling nonconforming items will be described in applicable documents. Nonconformance Reports issued as a result of an audit or surveillance will identify the root cause of the problem. Laboratories must notify the appropriate personnel of any nonconformance or problems with analytical samples. Laboratory corrective actions reports are completed by the analytical laboratory when a nonconformance is recognized by laboratory personnel. Handling of any nonconformance is described in appropriate plans and protocols.

Corrective actions to audit/surveillance findings and nonconformances are managed. The Task Manager is notified of a nonconformance and/or surveillance finding. These are documented and a copy is furnished to the Task Lead as soon as possible. Copies of audits, surveillances, and/or nonconformances and their dispositions will be forwarded to the appropriate management personnel and will be placed in the DMC.

15. QA REPORTS TO MANAGEMENT

Upon request, QA personnel will provide to management a report which summarizes QA activities for the task, system, and performance audits conducted (internal and external); quality problems found; corrective actions initiated; and other applicable items. Some reports that present measurement data generated during the work assignment may require a QA section addressing the quality and limitations of the data. This QA section will address results of audits or surveillance of the measurement work; quality problems found and corrective actions taken; and deviations from applicable documents.

16. FIELD CHANGES

Field changes will be governed by control measures commensurate with those applied to the documentation of the original protocol. The task team identifies, documents, and approves field changes. These changes are communicated to the team through the use of Change Notices and Change Orders.

REFERENCES

10 CFR 830.120, "*Quality Assurance*," April 1994.

Bechtel Jacobs Company LLC. Quality Assurance Program Plan, DRAFT, October 1998.

Energy Systems. *Environmental Measurements Data Management Plan Implementation Handbook for the Environmental Restoration Program*, ES/ER/TM-88/R1, 1996.

EPA. *Data Quality Objectives Process for Superfund*, Interim Final Guidance, EPA/540/G-93/071, 1993.

EPA. Hazardous and Solid Waste Amendment Permit, Permit #KY8890008982, August, 19, 1991.

EPA. *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, QAMS 005/80, December 20, 1980.

EPA. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 1986.

EPA. *EPA Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, May 1996.

Kentucky Division of Waste Management Hazardous Waste Management Permit, Permit No. KY8890008982, August 19, 1991.

Kentucky Agreement in Principle, January 1, 1997.

Quality Assured Data, PMSA-1001, Bechtel Jacobs Company LLC Procedures Manual, April 1997.

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APPENDIX A

TASK-SPECIFIC INFORMATION FOR QUALITY AND DATA ELEMENTS

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TASK-SPECIFIC INFORMATION FOR QUALITY AND DATA ELEMENTS

Purpose and Introduction

This plan can be used and implemented for the Paducah DOE tasks requiring the collection of analytical data. Each section of the FFA QA/DMP was written to meet data-quality requirements and provides a description of the programmatic elements which should occur for each task. This appendix provides additional information concerning the QA and Data Management aspects which are specific to the task and cannot be defined at the programmatic level. This appendix should be completed once the task has been planned or once the DQOs have been documented. This completed appendix, along with the "Data and Documents Management and Quality Assurance Plan for the Paducah Environmental Management and Enrichment Facilities Program," will serve as the "Quality Assurance and Data Management Plan" for the task, will be provided to appropriate personnel, and will be maintained as a task record.

For the purpose of this document, this appendix is not completed but shows the information to be completed for each task involved in the collection of analytical data. This appendix should be completed, printed with attachments compiled, combined with the "Data and Documents Management and Quality Assurance Plan for the Paducah Environmental Management and Enrichment Facilities Program," and distributed to the appropriate personnel for review, approval, and use.

INSTRUCTIONS FOR COMPLETING THE QUALITY ASSURANCE/DATA MANAGEMENT PLAN (QA/DMP)

Use the following instructions to complete each section for the task-specific QA/DMP. Attachments may be used to serve as and/or supplement the information provided in the tables.

TITLE PAGE: Type over the task-specific information in the underlined/bolded/italicized portion of the text. Information needed is the issue date, document number, document title, and author(s). Document numbers must be obtained from the Records Manager.

APPROVAL PAGE: Type over the task-specific information in the underlined/bolded/italicized portion of the text. Information needed is the preparers' names and titles and the approvers' names and titles. Minimum approvals are the Task Lead, Project Manager, and QA Manager.

TABLE OF CONTENTS AND ATTACHMENTS: Include the appropriate page numbers to the table of contents and identify and document the attachments provided to supplement this QA/DMP.

SECTION 1.0—TASK ORGANIZATION, RESPONSIBILITY, AND TRAINING: Identify the task organizational chart listing additional roles and responsibilities, including those identified in Section 2.2 of the "Data and Documents Management and Quality Assurance Plan for the Paducah Environmental Management and Enrichment Facilities Program." Also, document in Table 1.1 the training requirements for key personnel. An organizational chart and/or training matrix may be attached to this QA/DMP.

SECTION 2.0—DATA QUALITY OBJECTIVES (DQOs) AND SAMPLE PLANNING: Refer to PMSA-1001, *Quality Assured Data*, Appendix C, for directions to complete DQOs for the project. Attach DQO documentation to this QA/DMP. Using the DQO documentation, with assistance from the task team, identify details of the SAP. The SAP is generated out of the data needs identified in the DQOs and will specify applicable samples (i.e., regular samples, QC samples, and waste characterization samples) to be collected. Complete Table 2.1 (if SAP is not available) and/or attach the task SAP for environmental data. Complete Table 2.2 for waste characterization.

SECTION 3.0—APPLICABLE PROTOCOLS, DOCUMENTS, AND WORK INSTRUCTIONS: Identify the applicable protocols and documents (to data quality activities) which will be followed for the data collection activity and document in Table 3.1. Work instructions may be required for task-specific tasks.

When available and appropriate for the sample matrix, SW-846 Methods will be used. When not available, other nationally-recognized methods such as those of ASTM, DOE, and EPA will be used. Analytical methods are listed in Table 2.0 and in analytical SOWs; therefore, an additional listing of analytical methods is not required in Table 3.1.

SECTION 4.0—CALIBRATION PROTOCOLS AND FREQUENCIES: This section addresses documentation of field equipment and field support laboratory equipment which is to be calibrated for the task. Fixed-base laboratory calibration protocols and frequencies are not required to be included in this plan but are covered in the laboratory QA plans and protocols. The SMO oversight/audit has ensured the laboratory has met the requirements of SW-846. Calibration protocols and frequency information may be attached to this QA/DMP.

Identify the field equipment and field support laboratory equipment to be used during the data collection activity and document in Table 4.1 or attach supplemental information concerning equipment calibrations, the protocols, and frequencies.

SECTION 5.0—DATA REVIEW PROCESS: For details on the data review process, refer to PMSA-1001, *Quality Assured Data*, Appendices E, F, G, and H. Complete verification and assessment.

For the purposes of this section, contractual screening, data verification, and data assessment frequencies are identified in Table 5.1, Table 5.2, and Table 5.4, respectively; however, responsible personnel for these tasks must be identified and documented in the appropriate tables. Complete and attach Appendix G, “Data Quality Checks,” from PMSA-1001, *Quality Assured Data*, to better define verification and assessment criteria. Complete Table 5.3 to document the validation strategy defined by the task team.

SECTION 6.0—DOCUMENT AND RECORDS CONTROL AND TRANSFER: Identify the documents and records to be controlled during the task, the document or record name and type (i.e., a document such as a QA project plan or a record such as a logbook) and the frequency of transfer of the document or record to the EMEF DMC. Record this information in Table 6.1 for documents and Table 6.2 for records.

SECTION 7.0—QUALITY ASSESSMENT SCHEDULE: Identify and document in Table 7.1 the quality assessments to be performed for the task as requested by the Task Lead or other applicable managers.

DISTRIBUTION LIST: Identify and document the appropriate personnel to receive a copy of the QA/DMP.

REVIEWING, APPROVING, AND ISSUING THE QA/DMP: Upon completion of the above instructions, the QA/DMP should be printed, noticeably stamped “DRAFT,” and provided to the appropriate personnel for review. Comments should be received and resolved in a timely manner. The revised QA/DMP should be printed, approved, and provided to the appropriate personnel as defined in the distribution list.

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DATE OF ISSUE: **DATE**

DOCUMENT NO., REV. NO.

PROJECT TITLE
QUALITY ASSURANCE AND DATA MANAGEMENT PLAN

AUTHOR(S)

Prepared by
Environmental Management and Enrichment Facilities
Kevil, Kentucky 42053
Managed by
BECHTEL JACOBS COMPANY
for the
U. S. DEPARTMENT OF ENERGY
Under Contract No. DE-AC05-98OR22700

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PROJECT TITLE
QUALITY ASSURANCE AND DATA MANAGEMENT PLAN

APPROVALS

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Name
Title

Prepared by: _____ **Date:** _____
Name
Title

Approved by: _____ **Date:** _____
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Approved by: _____ **Date:** _____
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Approved by: _____ **Date:** _____
Name
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Approved by: _____ **Date:** _____
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Title

Approved by: _____ **Date:** _____
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Title

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CONTENTS

- 1.0 TASK ORGANIZATION, RESPONSIBILITY, AND TRAINING**
- 2.0 DATA QUALITY OBJECTIVES AND SAMPLE PLANNING**
- 3.0 APPLICABLE PROTOCOLS AND DOCUMENTS**
- 4.0 CALIBRATION PROTOCOLS AND FREQUENCIES**
- 5.0 DATA REVIEW PROCESS**
- 6.0 DOCUMENT AND RECORDS CONTROL AND TRANSFER**
- 7.0 ASSESSMENT SCHEDULE**

ATTACHMENTS

- 1 Organizational Chart**
- 2 Training Matrix**
- 3 DQO Documentation**
- 4 Sampling and Analysis Plan**
- 5 Figures/Drawings of Area**
- 6 Calibration Protocols and Frequencies**
- 7 Data Quality Checks Checklist**

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1.0 TASK ORGANIZATION, RESPONSIBILITY, AND TRAINING

Table 1.1. Task Organization, Responsibility, and Training.

Job Title or Position	Name	Role, Responsibility, and Interface	Training*
DOE Project Manager			
Data Clerk			
Data Manager	M&I Data Manager/ Subcontractor Personnel		
Network Administrator	M&I Network Administrator		
Project Manager			
Project Engineer			
QA Specialist			
Records Clerk			
Records Manager	M&I Records Manager/ Subcontractor Personnel		
Sample Manager	M&I Sample Manager/ Subcontractor Personnel		
Task Lead			
Task Manager			
Field Team Leader	Subcontractor Personnel		
Samplers	Subcontractor Personnel		
Drillers	Subcontractor Personnel		
Other	Subcontractor Personnel		
Other	Subcontractor Personnel		

*The required training (GET, GERT, RAD II, etc.) should be identified for Subcontractor Personnel for this project.

Identify Location of Training Records for Subcontractor Personnel: _____

2.0 DATA QUALITY OBJECTIVES AND SAMPLE PLANNING

Table 2.1. DQOs and sample planning for environmental data collection.

Sampling Location	Matrix	Sampling Method(s)	Sampling Frequency	Data Type(s) (Screen or Def)	Analyte(s)	Analytical Method	Detection Limit(s)	Holding Time	Container	Preservative
<i>Regular Samples</i>										
<i>QC Samples</i>										

Table 2.2. DQOs and sample planning for waste characterization data collection.

Material/ Volume/ Container	Preliminary Classification	Characterizat ion Method	Future Disposition	Analyte(s)	Analytical Method	Detection Limit(s)	Holding Time	Container	Preservative
<i>Regular Samples</i>									
<i>QC Samples</i>									

3.0 APPLICABLE DOCUMENTS, PROTOCOLS, AND WORK INSTRUCTIONS

Table 3.1. Applicable documents, protocols, and work instructions.

Protocol Number	Protocol Name	Applicability	
		Yes	No
	<i>General</i>		
	List appropriate protocols for to be used for chain-of-custodies, logbooks, ensuring quality data, etc.		
	<i>Sampling</i>		
	List appropriate sampling protocols to be used.		
	<i>Data Management</i>		
	List appropriate data management protocols to be used.		
	<i>Data Validation</i>		
	List appropriate data validation protocols to be used.		

4.0 CALIBRATION PROTOCOLS AND FREQUENCIES

Table 4.1. Field equipment and field support laboratory calibration protocols and frequencies.

Equipment & Serial No.	Field Usage	Calibration Check Frequency	Calibration Check Material	Calibration Check Protocol
<i>Field Equipment</i>				
<i>Field Support Laboratory Equipment</i>				

5.0 DATA REVIEW PROCESS

Table 5.1. Contractual screening.

Responsible Person: _____

Other: _____

Table 5.2. Data verification.

Responsible Person: _____

Other: _____

Table. 5.3. Details for performing data validation.

Frequency	Data Package Type	Analytes & Media	Protocol Used	Completed By

Responsible Person: _____

Table 5.4. Data assessment.

Responsible Person: _____

6.0 DOCUMENT AND RECORDS CONTROL AND TRANSFER

Table 6.1. Identification of documents.				
Document Name and Type	Controlled Document (Yes* or No)	Storage Location	Frequency of Transfer	Comments

* If a document is identified as a “controlled document”, then a distribution list must be created, maintained, and updated, as needed. The access control method for the “controlled document” must be defined and implemented.

Table 6.2. Identification of records.				
Record Name and Type	Quality Record (Yes or No)	Storage Location	Frequency of Transfer	Comments

7.0 ASSESSMENT SCHEDULE

Table 7.1. Assessment schedule.			
Audit/Surveillance/ Self Assessment No.	Subject/Topic	Date	Completed By

DISTRIBUTION

(List appropriate names and associated organization, if needed, for distribution of document.)

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APPENDIX B

DATA DICTIONARY AND FORMATS FOR PADUCAH OREIS TRANSMITTALS

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TRANSMITTAL FORMAT

Transmittal format for all data transmittals will be in exported database format (.dbf) and as a Microsoft Access table (version 97 or more recent). The file will be added to the password-protected external server under the base directory \\home\oreis\data\ in a zipped file named according to the structure outlined below that corresponds to Table 1 in addition to other applicable transmittals.

KPDES Permit DOE Outfalls, Toxicity Monitoring, Bioaccumulation Study, Fish Community

...\data\permit\KPDES\KPDESTYYYY-MM

where T corresponds to the sample type (i.e., R=regular permitted sampling, T=toxicity sampling, B=bioaccumulation sampling, F=fish community sampling)
 YYYY corresponds to the calendar year, and
 MM corresponds to the month

C-746-K Surface Water, C-746-K Groundwater

...\data\permit\C746K\KMYYYY-SA

where M corresponds to the media (i.e., S=Surface water, G=Groundwater)
 YYYY corresponds to the calendar year, and
 SA corresponds to the 1st or 2nd half of the year

C-746-S&T Surface Water, C-746-S&T Groundwater, C-746-S&T Leachate

...\data\permit\C746S&T\S_TMYYYY-QQ

where M corresponds to the media (i.e., S=Surface water, G=Groundwater, L=Leachate)
 YYYY corresponds to the calendar year, and
 QQ corresponds to the quarter

C-746-U Surface Water, C-746-U Groundwater, C-746-U Leachate

...\data\permit\C746U\UMYYYY-QQ

where M corresponds to the media (i.e., S=Surface water, G=Groundwater, L=Leachate)
 YYYY corresponds to the calendar year, and
 QQ corresponds to the quarter

C-404 Groundwater, C-404 Leachate

...\data\permit\C404\404MYYYY-SA

where M corresponds to the media (i.e., S=Surface water, G=Groundwater, L=Leachate)
 YYYY corresponds to the calendar year, and
 SA corresponds to the 1st or 2nd half of the year

Environmental Monitoring Surface Water Sampling

...\data\envmon\SW-YYYY

where YYYY corresponds to the calendar year

Environmental Monitoring Sediment Sampling

...\data\envmon\SD-YYYY

where YYYY corresponds to the calendar year

Environmental Monitoring Deer Sampling

...\data\envmon\D-YYYY

where YYYY corresponds to the calendar year

Environmental Monitoring Plume Groundwater Sampling

...\data\envmon\PI-GW\PIGWYYYY-QQ

where YYYY corresponds to the calendar year, and
 QQ corresponds to the quarter

Environmental Monitoring Residential Groundwater Sampling

...\data\envmon\Res-GW\ResGWYYYY-SA

where YYYY corresponds to the calendar year, and
 SA corresponds to the 1st or 2nd half of the year

Environmental Monitoring Surveillance Groundwater Sampling

...\data\envmon\Sur-GW\SurGWYYYY-SA

where YYYY corresponds to the calendar year, and
 SA corresponds to the 1st or 2nd half of the year

S&M/O&M Northwest Plume Operations Sampling

...\data\sm_om\NWYYYY-QQ

where YYYY corresponds to the calendar year, and
 QQ corresponds to the quarter

S&M/O&M Northeast Plume Operations Sampling

...\data\sm_om\NEYYYY-QQ

where YYYY corresponds to the calendar year, and
 QQ corresponds to the quarter

DOE Remedial Action Investigations

...\data\ra\PROJCODE

where PROJCODE corresponds to the PROJ_CODE in Paducah OREIS (e.g., ERI-WAG6, ERI98-698W22, etc.)

Special Requests

...\data\requests\YYYYMMDD-A

where YYYY corresponds to the calendar year,
 MM corresponds to the month,
 DD corresponds to the day of the request, and
 A corresponds to the sequential number for the request.

Lithology

...\data\lith\PROJCODE

where PROJCODE corresponds to the PROJ_CODE in Paducah OREIS from which the lithology description was collected (e.g., ERI-WAG6, ERI-WAG 27, LASAGNA, etc.)

GIS Themes/Coverages

...\data\gis\

Each file will be named to appropriately describe the theme/coverage. Updates to themes/coverages will be named identical to the previous version with a revision number immediately following (e.g., roads, roads1, roads2, etc.).

GIS Themes/coverages will be in a format compatible to be viewed in ArcView 2.0 or higher (i.e., ArcInfo Coverages, AutoCAD drawings, etc.)

DATA DICTIONARY INFORMATION**CODE**

The CODE table contains the codes used in Paducah OREIS tables and their descriptions.

CODE	Code referenced in other Paducah OREIS tables.
CODE_DESCRIPTION	Description of the coded value. This is the 'decoded' value.
CODE_TYPE	Column name for the codes and descriptions. This value identifies the type of coded value.

PROJECT FLD SMP MEAS

The export of PROJECT FLD SMP MEAS table contains the measurement data taken in the field, which is associated with specific SAMPLEs collected during a STATION_EVENT. Examples are flow rate, depth, and temperature. Only those field measurements directly associated with a SAMPLE will be stored in the FLD_SMP_MEAS table. Field measurement data collected, not directly associated with a SAMPLE (e.g., water level suites) will also be in this format.

PROJ_CODE	Acronym assigned by the project (e.g., "ERI-WAG6" for the WAG 6 Environmental Restoration Field Investigation).
STA_NAME	Unique station name assigned by the individual projects (e.g., 400-212 or MW156).
PROJ_SAMPLE_ID	Unique sample identifier assigned by the project.
SAMPLE_COMMENTS	Comments about the sample.
SMP_STRT_LEVEL	For a measurement taken over a range of elevations or depths, the upper vertical distance in feet of the measurement from ground surface.
SMP_END_LEVEL	For a measurement taken over a range of elevations or depths, the lower vertical distance in feet of the measurement from ground surface.
MED_TYPE	Coded value that represents the part of the environment from which a sample is collected, or on which a field measurement or observation is made. See CODE table where CODE_TYPE = MED_TYPE for a list of valid values and their descriptions.
SMP_TYPE	Coded value that represents the type of sample collected. See CODE table where CODE_TYPE = SMP_TYPE for a list of valid values and their descriptions.
D_COLLECTED	Date sample was collected.
CHEMICAL_NAME	Description of the chemical or measurement parameter. For CAS numbers, this is the preferred name defined by the Common Lab Practices Committee.
CAS_NUM	Chemical Abstract Services number with dashes, blank if no CAS number is available.
LAB_CODE	Coded value assigned by the project that represents the analytical laboratory that performed the analysis of the sample. See the CODE table where CODE_TYPE = LAB_CODE for a list of valid values and their descriptions.
RESULTS	Measurement for a given parameter.
RSLT_PREFIX_QUALIFIER	A qualifier indicating whether the result is below, within, or above range limits. See CODE table where CODE_TYPE = RSLT_PREFIX_QUALIFIER for a list of valid values and their descriptions.

RSLTQUAL	Coded value that documents any conditions associated with the results of the analysis. See CODE table where CODE_TYPE = RSLTQUAL for a list of valid values and their descriptions.
UNITS	Coded value that represents the units of measure used to report the parameter value. See CODE table where CODE_TYPE = UNITS for a list of valid values and their descriptions.
NON_COMPLI_CODE	For Paducah OREIS, this field designates electronic verification qualifiers assigned during the Data Assessment process according to PMSA-1001. See CODE table where CODE_TYPE = NON_COMPLI_CODE for a list of valid values and their descriptions. A null field may indicate no criteria were established or may indicate verification was clear. Non-standard criteria are established on a project-by-project basis.
VALIDATION	Coded value that represents the outcome of the data validation process. See CODE table where CODE_TYPE = VALIDATION for a list of valid values and their descriptions.
ASSESSMENT	Coded value describing assessment qualifiers added to data as a result of PMSA-1001. Applies only to data generated after effective date of procedure. See CODE table where CODE_TYPE = ASSESSMENT for a list of valid values and their descriptions.
FLD_COMMENTS	Comments about the measurement.
ANA_METHOD	Method number used to identify a standard analysis method.
ANA_TYPE	Coded value of the chemical group to which the analyte belongs. See CODE table where CODE_TYPE = ANA_TYPE for a list of valid values and descriptions.

PROJECT LAB MEAS

The export of PROJECT LAB MEAS table contains the measurement data analyzed by an analytical laboratory, which is associated with specific SAMPLEs collected during a STATION_EVENT.

PROJ_CODE	Acronym assigned by the project (e.g., "ERI-WAG6A" for the WAG 6 Environmental Restoration Field Investigation).
STA_NAME	Unique station name assigned by the individual projects (e.g., 400-212 or MW156).
PROJ_SAMPLE_ID	Unique sample identifier assigned by the project.
SAMPLE_COMMENTS	Comments about the sample.
SMP_STRT_LEVEL	For a measurement taken over a range of elevations or depths, the upper vertical distance in feet of the measurement from ground surface.
SMP_END_LEVEL	For a measurement taken over a range of elevations or depths, the lower vertical distance in feet of the measurement from ground surface.
MED_TYPE	Coded value that represents the part of the environment from which a sample is collected, or on which a field measurement or observation is made. See CODE table where CODE_TYPE = MED_TYPE for a list of valid values and their descriptions.
SMP_TYPE	Coded value that represents the type of sample collected. See CODE table where CODE_TYPE = SMP_TYPE for a list of valid values and their descriptions.
D_COLLECTED	Date sample was collected.

CHEMICAL_NAME	Description of the chemical or measurement parameter. For CAS numbers, this is the preferred name defined by the Common Lab Practices Committee.
CAS_NUM	Chemical Abstract Services number with dashes, blank if no CAS number is available.
LAB_CODE	Coded value assigned by the project that represents the analytical laboratory that performed the analysis of the sample. See the CODE table where CODE_TYPE = LAB_CODE for a list of valid values and their descriptions.
RESULTS	Measurement for a given parameter.
RSLT_PREFIX_QUALIFIER	A qualifier indicating whether the result is below, within, or above range limits. See CODE table where CODE_TYPE = RSLT_PREFIX_QUALIFIER for a list of valid values and their descriptions.
RSLTQUAL	Coded value that documents any conditions associated with the results of the analysis. See CODE table where CODE_TYPE = RSLTQUAL for a list of valid values and their descriptions.
UNITS	Coded value that represents the units of measure used to report the parameter value. See CODE table where CODE_TYPE = UNITS for a list of valid values and their descriptions.
RAD_ERR	The counting error for a specific radionuclide expressed as 2 standard deviations.
NON_COMPLI_CODE	For Paducah OREIS, this field designates electronic verification qualifiers assigned during the Data Assessment process according to PMSA-1001. See CODE table where CODE_TYPE = NON_COMPLI_CODE for a list of valid values and their descriptions. A null field may indicate no criteria were established or may indicate verification was clear. Non-standard criteria are established on a project-by-project basis.
VALIDATION	Coded value that represents the outcome of the data validation process. See the CODE table where CODE_TYPE = VALIDATION for a list of valid values and their descriptions.
ASSESSMENT	Coded value describing assessment qualifiers added to data as a result of PMSA-1001. Applies only to data generated after effective date of procedure. See CODE table where CODE_TYPE = ASSESSMENT for a list of valid values and their descriptions.
LAB_COMMENTS	Comments about the individual sample.
ANA_METHOD	Method number used to identify a standard analysis method.
ANA_TYPE	Coded value of the chemical group to which the analyte belongs. See CODE table where CODE_TYPE = ANA_TYPE for a list of valid values and descriptions.

STATION-LOCATION

The export of STATION-LOCATION table contains the data about sampling points associated with one or more projects. Each point has a distinct station name/station type within a project. Locational information contains coordinate and other information describing a point on the ground. Most location are points described by x,y coordinates, but a location could be a line or a polygon where measuring events occur. In those cases, a single point, such as the estimated center point, is used.

STA_NAME	Unique station name assigned by the individual projects (e.g., GW101).
STA_TYPE	Coded value that represents the type of station (e.g., seep, spring, well). See CODE table where CODE_TYPE = STA_TYPE for a list of valid values and their descriptions.
STATION_COMMENTS	Comments about the station.
STA_DESC	Description of the specific sampling or measuring location.
GRND_ELV	Elevation of ground surface (for groundwater, soil, or sediment sampling) at a sampling or measuring location in feet above mean sea level (msl).
ADMIN_EAST	X-value of the distance in feet of a sampling or measuring location from the reference location based on the administrative coordinate grid system.
ADMIN_NORTH	Y-value of the distance in feet of a sampling or measuring location from the reference location based on the administrative coordinate grid system.
SWMU	Acronym for Solid Waste Management Unit, if applicable.
LOCATION_COMMENTS	Comments about the location.
DATUM	Coded value that represents the method by which reference points were established (e.g., NAD27, NAD83). Datum should be associated with the state plane coordinate system. It is not valid for administrative grid. See CODE table where CODE_TYPE = DATUM for a list of valid values and their descriptions.
SPLANE_EAST	X-value of the distance in meters of a sampling or measuring location from the reference location based on the state plane coordinate grid system.
SPLANE_NORTH	Y-value of the distance in meters of a sampling or measuring location from the reference location based on the state plane coordinate grid system.
LOC_ERROR	Station location error in feet.
LOC_METHOD	Coded value that represents the method used for locating the station. See CODE table where CODE_TYPE = LOC_METHOD for a list of valid values and their descriptions.

LITHOLOGY

The LITHOLOGY export provides a description of a material (e.g., sand, gravel) encountered underground at a given location at a specific interval within a well, borehole, etc. and the discrete fixed top and bottom points of the interval where the sample was taken.

CONSTR_DEPTH_VAL	The total measurement from the ground surface of a hole downward to the bottom of the screening material in a well, expressed in feet.
-------------------------	--

HOLE_DIAM	Diameter in inches of the well. If more than one diameter is available, this column will contain the smallest diameter and the others will be listed in the COMMENTS column.
LOG_FLAG	A flag which indicates that reference source information (e.g., geophysical logs) exists.
LOG_TYPE	Coded value that represents a specific geophysical log. An example would be CL for Caliper Log, GRL for Gamma Ray Log. A name or abbreviation representing a type of LOG used in geologic work (e.g., driller, caliper, gamma). See CODE table where CODE_TYPE = LOG_TYPE for a list of valid values and their descriptions.
TOT_DRILLED_DEPTH	The total measurement from the ground surface to the bottom of a newly-constructed well after any plug back material has been added, expressed in feet.
INT_BOT_DEPTH_VAL	The distance in feet, from the ground surface to the bottom of a monitored interval.
INT_TOP_DEPTH_VAL	The distance in feet, from the ground surface to the top of a monitored interval.
MONIT_INT_NAME	The name (or number) assigned to a given monitored interval at a given location.
MONIT_ZONE_CODE	Coded value that represents the generic interval of a saturated zone that a hole monitors. A monitored interval can cut across multiple zones. See CODE table where CODE_TYPE = MONIT_ZONE_CODE for a list of valid values and their descriptions.
INT_MATL_CODE	Coded value that represents a specific characteristic or set of characteristics of the solid content found at a specific location. See CODE table where CODE_TYPE = INT_MAT_TYPE for a list of valid values and their descriptions.
STRAT_SEQ	Number assigned by the site geologist to each distinct lithologic layer at a site.
VISUAL_DESC	Textual and mineralogical description of the material comprising the layer to augment or qualify the lithtype code (e.g., grain sizes, color, secondary characteristics).

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